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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/630,680	08/01/2000	Shinichi Imai	819-405	7497

7590

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EXAMINER

AHMED, SHAMIM

ART UNIT

PAPER NUMBER

1765

15

DATE MAILED: 02/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/630,680	IMAI, SHINICHI	
	<b>Examiner</b>	<b>Art Unit</b>	
	Shamim Ahmed	1765	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 November 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,4,6,7,9,10 and 12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6,7,9,10 and 12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 August 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \*   c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                          | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>12</u> . | 6) <input type="checkbox"/> Other:  |

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/26/02 has been entered.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1,3-4 and 6 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amendment to the claims 1 and 4 (line 4 for both of the claims), introduces a phrase "fluorocarbon gas **alone**", which is not described in the specification in such that only fluorocarbon gas is introduced to etch the silicon dioxide film.

The specification discloses that a fluorocarbon gas is introduced into the reaction chamber (page 27, lines 23-25) that does not provide evidence that the fluorocarbon gas alone is introduced into the chamber.

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4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

5. Claims 1,3-4 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Regarding claims 1 and 4, line 4, the phrase " a fluorocarbon gas alone" renders the claim indefinite because it is unclear whether the gas alone excluding any other inert gases or a mixture of fluorocarbon gases or only one fluorocarbon gas is introduced in the reaction chamber.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1,3-4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inazawa et al (5,595,627) in view of Yanagida (5,338,399).

Inazawa et al disclose a plasma etching process, wherein a silicon dioxide layer is etched over a substrate using a fluorocarbon gas such as C<sub>4</sub>F<sub>8</sub> (col.2, lines 16-20).

Inazawa et al fail to disclose that only fluorocarbon gas is introduced into the reaction chamber.

However, in a method of etching silicon dioxide, Yanagida teaches that only fluorocarbon gas such as a mixed gas of  $\text{CF}_4$  and  $\text{C}_6\text{F}_6$  is introduced for increasing the polymerization of the carbonaceous polymer (col.3, lines 16-41).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Yanagida's teaching into Inazawa et al's process for increasing the polymerization of the carbonaceous polymer as taught by Yanagida.

Inazawa et al also disclose that residence time of the processing gas is determined and Controlled in a predetermined range.

Further more, Inazawa et al teach that the value of the residence time dependence on the basis of the target value of the etching ratio (col.7, lines 18-25 and col.8, lines 14-24).

Inazawa et al fail to teach the exact value of the residence time.

However, it would have been obvious to one skill in the art at the time of claimed invention to optimize the specific time for the etching in order to maintain a proper etching section ratio, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

As to claim 4, Inazawa et al teach that pressure of the processing chamber, flow rate of the fluorocarbon gas and the voltage is controlled by a controller section (col.8, lines 36-42).

Inazawa et al remain silent about controlling  $P \times w_0 / Q$  at  $0.8 \times 10^4$  sec.  $\text{W/m}^3$  or less than  $8 \times 10^4$  sec. $\text{W/m}^3$ .

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However, it would have been obvious to one skill in the art at the time of claimed invention to optimize the same for effective etching ratio, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

9. Claims 7, 9, 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al (5,244,730) in view of Mountsier et al (6,184,572).

Nguyen et al disclose a plasma process, wherein an organic film is deposited on a substrate by introducing a fluorocarbon gas of  $C_4F_8$  (col.3, lines 37-49).

As to claim 7, Nguyen et al fail to disclose the fluorocarbon gas could be at least one of  $C_4F_6$ , and  $C_5F_8$  gases.

However, Mountsier et al teach that hexafluorobenzene ( $C_6F_6$ ) is a beneficial fluorocarbon gas over a commonly used fluorocarbon gas such as  $C_4F_8$  to deposit organic film (col.3, lines 6-18).

Moutsier et al also disclose that the resulting film has better capability to withstand in high temperature (col.3, lines 6-18).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Mountsier et al's teaching into Nguyen et al's process in order to deposit an organic film, which exhibit greater thermal stability and furthermore, both the fluorocarbon gases are functionally equivalent as taught by Mountsier et al.

Nguyen et al also disclose that pressure, flow rate and the residence time of the fluorocarbon gas is maintained at about 0.9 seconds (col.3 lines 37-49 and col.4, lines

14-17), wherein the residence time is generally expressed by a simple equation:

residence time = capacity of the processing chamber x pressure / supply rate of the processing gas, which is supported by Inazawa et al (col.7, lines 17-22 of the patent 5,595,627).

As to claims 9 and 12, Nguyen et al teach that a pump controls the pressure of the chamber and also the flow rate of the gas is controlled by a valve (col.4, lines 31-36 and lines 45-48).

Nguyen et al fail to teach the residence time is controlled at 0.1 second or less. —

Examiner takes an official notice that it would have been obvious to one skill in the art at the time of claimed invention to optimize the residence time depending on a required thickness of the deposited film, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

By doing so, one could have better process control to achieve a desired coating on a substrate.

As to claim 10, Nguyen et al disclose that power density is of the process is typically maintain at the range of 0.05 to about 0.4 W per cm<sup>2</sup> along with the residence time (col.4, lines 49-59).

Nguyen et al remain silent about controlling  $P \times w_0 / Q$  at  $0.8 \times 10^4 \text{ sec.W/m}^3$ . It would have been obvious to one skill in the art at the time of claimed invention to optimize the same for efficient controlling the deposition rate, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the

optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

### ***Response to Arguments***

10. Applicant's arguments filed 11/26/02 with respect to claims 1,3-4 and 6 as rejected over Inazawa et al (5,595,627) in view of Zhu et al (6,297,163) have been considered but are moot in view of the new ground(s) of rejection above.

11. Regarding Mountsier et al (6,184,572), Applicant's arguments filed 11/26/02 have been fully considered but they are not persuasive. Applicants argue that Mountsier et al disclose a fluorocarbon gas composed of  $C_4F_6$  or  $C_4F_8$  but do not disclose that the use of either  $C_4F_6$  and  $C_5F_8$ .

In response, examiner states that the primary reference Nguyen et al (5,244,730) disclose a step of depositing an organic film using a fluorocarbon gas composed of  $C_4F_8$  (see the rejection above).

However, Mountsier et al disclose a fluorocarbon gas composed of  $C_4F_6$  or  $C_4F_8$  or in other words, both the gases of  $C_4F_6$  and  $C_4F_8$  are functionally equivalent (see the rejection above).

Therefore, Mountsier et al teach that the use of fluorocarbon gas is  $C_4F_6$ .

### ***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Desilets et al (4,826,564) teaches that silicon oxide is etched by using etching gas comprises fluorocarbon alone (see claim 11) and Engl et al



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(3,908,041) disclose a conventional etching of silicon dioxide using fluorocarbon and an inert gas.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703)-872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Shamim Ahmed  
Patent Examiner  
Art Unit 1765

SA  
January 23, 2003